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## **The structure of protection and growth in the late 19<sup>th</sup> century**

### **Abstract**

Many papers have explored the relationship between average tariff rates and economic growth, when theory suggests that the structure of protection is what should matter. We therefore explore the relationship between economic growth and agricultural tariffs, industrial tariffs, and revenue tariffs, for a sample of relatively well-developed countries between 1875 and 1913. Industrial tariffs were positively correlated with growth. Agricultural tariffs were negatively correlated with growth, although the relationship was often statistically insignificant at conventional levels. There was no relationship between revenue tariffs and growth.

**Keywords:** tariffs, growth, history

**JEL codes:** F13, F43, N10, N70, O49

## 1. Introduction

There is a fundamental disconnect between empirical and theoretical work on the relationship between trade policy and economic growth. The basic insight of trade theory is that trade and protection influence the inter-sectoral allocation of resources. In the context of traditional static trade theory, protection (usually) reduces welfare, irrespective of what goods an economy is exporting and importing, since it reduces the output of the good in which the economy has a comparative advantage, and raises the output of the good in which the economy has a comparative disadvantage. Thus protection reduces the gains from trade, regardless of what goods are being protected.

However, theoretical models linking trade and growth typically specify asymmetries between sectors. In these models, it matters fundamentally what goods are being protected in an economy. For example, in Matsuyama (1992) the engine of growth is taken to be learning-by-doing in manufacturing, a phenomenon which is by assumption absent in agriculture. In this model, anything that increases the size of the agricultural sector is bad for growth. While tariff policy is not a focus of Matsuyama's paper, it might be supposed that in this case, agricultural protection should reduce growth, while industrial protection should raise it.<sup>1</sup>

Alternatively, during the late 19th century, and at many other moments of history besides, urban wages far exceeded rural ones, suggesting that the marginal product of labour was lower in agriculture than in industry. Recent empirical work by authors such as Broadberry (1997, 1998) and Temin (2002), building on earlier contributions by pioneers such as Edward Denison and Simon Kuznets (e.g. Denison 1968, Kuznets 1957), has emphasised that an important contribution to European growth over the past two centuries has been the reallocation of labour from agriculture to industry and services.<sup>2</sup> Temin argues that agricultural protection in countries like Germany (as well as the disruption to trade associated with the turmoil of 1914-45) slowed down this

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<sup>1</sup> In fact, Rodríguez and Rodrik (2000, pp. 269-272) show that matters are slightly more complicated than this. In the case of a country protecting its manufacturing sector, the static welfare loss implied by the tariff increases over time as the manufacturing sector gets bigger. The implication is that growth rates are initially an increasing, and then a decreasing, function of the manufacturing tariff.

<sup>2</sup> For a similar argument in the context of the United States, see Caselli and Coleman (2001).

reallocation, and hence slowed growth. On the other hand, one might think that industrial protection should have speeded up the reallocation of labour to industry, hence raising growth. Admittedly, in a sufficiently long run perspective such inter-sectoral shifts represented a transition between two equilibria, and the growth they gave rise to was thus a disequilibrium phenomenon, rather than long run growth strictly speaking. In this respect, the argument is fundamentally different from Matsuyama's. Nonetheless, the time frame over which the reallocation took place was a very long one. Hence, if the rate of inter-sectoral labour reallocation speeded up or slowed down due to changes in tariff policy, this might show up in changed growth rates over the sort of short to medium run time periods that authors such as Clemens and Williamson (2004), Harrison (1996), O'Rourke (2000) and Vamvakidis (2002) have explored.

Theory thus suggests that the relationship between protection and growth depends on what is being protected. We are by no means the first people to have pointed this out, either explicitly or implicitly. Indeed, the models presented in Grossman and Helpman (1991) suggest that the relationship between trade and growth is fundamentally ambiguous, and it follows that the relationship between trade policy and growth will be ambiguous as well. As Rodríguez and Rodrik (2000, pp. 268-9) put it, paraphrasing Grossman and Helpman,

the general answer to the question "Does trade promote innovation in a small open economy?" is "It depends." In particular, the answer depends on whether the forces of comparative advantage push the economy's resources in the direction of activities that generate long-run growth (via externalities in research and development, expanding product variety, upgrading product quality, and so on) or divert them from such activities.

It is therefore striking that the vast majority of papers on the relationship between protection and growth (including classic papers such as Sachs and Warner 1995, or the other papers surveyed by Rodríguez and Rodrik) have related growth rates to *average* measures of protection, as though all countries imported similar commodities, which they clearly do not. This is a failing, not just of research on late 20<sup>th</sup> century growth, but of the smaller literature on the relationship between protection and growth in the late 19<sup>th</sup> century, or more precisely during the period from 1870 to 1913, as well. Papers in this

vein include O'Rourke (2000); Irwin (2001); Vamvakidis (2002); Clemens and Williamson (2004); and Jacks (2006).

The most notable feature of this historical literature is that it has uncovered a positive correlation between average tariffs and growth, in stark contrast to the typical late 20<sup>th</sup> century finding of a negative correlation. Whether this positive correlation reflects a causal relationship is not clear, with Douglas Irwin in particular arguing against such an interpretation of the data (e.g. Irwin 2001, 2002). What all these papers have in common, however, is a reliance on economy-wide average measures of protection. Surely we can do better than this. In particular, given the theoretical arguments outlined above, and given the fact that the late 19<sup>th</sup> century was a period which saw many countries successfully make the transition from being predominantly agricultural to being predominantly industrial, we should surely be asking whether agricultural and industrial tariffs had the same impact on growth or not. This is especially true, since many rapidly industrialising countries during this period imposed high manufacturing tariffs, in an explicit attempt to promote their own industries. Did such tariffs promote or retard economic growth more generally? And did they have the same effect as agricultural tariffs, or the opposite effect?

The reason why scholars have not gone any further to date is simply that it is extremely difficult to obtain disaggregated indices of tariff protection. Average tariffs are easily calculated: all one needs to do is to divide total customs revenue, which governments have long collected, by the total value of imports. These data are readily available for a wide variety of countries. In order to obtain disaggregated tariffs, however, even for extremely broad aggregates such as 'agricultural goods' and 'manufactures', the researcher has to adopt one of two approaches. She can try to collect tariffs for individual commodities, and construct some sort of weighted average of these. Here one immediately runs into the practical problem that different countries do not report tariffs for the same commodities, and indeed that the same commodities are not of equal relevance for different countries, given differences in the structure of production and trade.

In this paper we adopt a second approach, which is easier, but still difficult and time-consuming. This consists of dividing imports into the desired number of categories,

in our case three: agricultural, industrial, and ‘exotic’. The last category consists of goods such as coffee, tea and spices which were not produced in the countries concerned, and whose imports were taxed simply to provide governments with revenue. As will be seen, there are a number of issues which arise in choosing how to allocate goods between these three categories, and we have therefore tried a number of different specifications, to see if the judgement calls which we have had to make have materially influenced our results. Obtaining such a breakdown of imports typically involved going back to countries’ annual trade returns. Next, we calculated a similar breakdown of customs revenues into the same three categories, which involved consulting government returns giving revenues by tax source. Dividing customs revenues by tariffs yielded our average tariff data for these three commodity categories. The hope is that by obtaining such data, we will be better able to interpret the positive correlation between average tariffs and growth during this period, seeing whether it is completely spurious (e.g. driven by movements in ‘exotic’ revenue tariffs alone), or corresponds to underlying relationships that are in accord with the sorts of theoretical arguments mentioned above.<sup>3</sup>

There are two strands of recent research which are closely related to this paper. The first is a very small number of papers exploring the relationship between the structure of protection and growth econometrically, using late 20<sup>th</sup> century data. Nunn and Trefler (2004) calculate tariffs separately for skill-intensive and unskilled-labour-intensive industries, and find that countries that protect the former grow more rapidly than countries that protect the latter.<sup>4</sup> The second is work by Tena Junguito (2008), who adopts the Nunn-Trefler distinction between skill-intensive and unskilled-labour-intensive industries, and provides cross-section regressions relating growth between 1870-5 and 1913 to tariffs in the 1870s. In the context of the late 19<sup>th</sup> century, it would surely make more sense to look at the differing impacts of agricultural and industrial protection, and that is the approach taken here. Furthermore, given that tariffs changed so much in the late 19<sup>th</sup> century, a purely cross-section approach misses a lot of the action.

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<sup>3</sup> It would clearly be preferable to construct Anderson-Neary (2005) Trade Restrictiveness Indices, such as have recently been computed by the World Bank (Kee et al. 2006), but this seems impossible for the late 19<sup>th</sup> century.

<sup>4</sup> An even more recent paper by Estevadeordal and Taylor (2007) disaggregates tariffs into tariffs on capital and consumption goods



We therefore look at the relationship between tariffs and growth, exploiting variation in the data both across countries and over time. On the other hand, a particular concern of Tena's has been to separate out revenue tariffs from tariffs which might reasonably be taken to have been protective, and this is exactly mirrored in the approach adopted here.

## **2. Disaggregated tariff data**

We use the same sample of countries as in O'Rourke (2000). The ten countries considered are: Australia, Canada, Denmark, France, Germany, Italy, Norway, Sweden, the United Kingdom and the United States. The time period under consideration is 1875-1913. In order to calculate tariffs for agricultural goods, manufactures and 'exotics' we first collected annual data on customs revenues and imports for each commodity listed in the relevant financial or trade statistical report. Different countries broke down their customs revenues or imports in different ways, and the degree of disaggregation varied considerably. In Italy, both customs revenues and imports were broken down into 16 identical (later 19) commodity categories. By contrast, our Canadian import statistics broke down total imports into more than 200 categories, while our US customs revenue statistics broke down customs revenues into more than 250 categories. We collected all of these data for each country and each year. We then classified each of these commodity categories in the import statistics and the customs revenue statistics as belonging to either agricultural goods, manufacturing, or 'exotics', which allowed us to calculate total imports and total customs revenues for each of these three broad groups for every country and every year.<sup>5</sup> Dividing customs revenues by total imports then gave us average tariffs for agriculture and industry, as well as average revenue tariffs, for every country and year. Having calculated an annual average tariff for each category, we then converted these to five-year averages (1875-79, 1880-84 and so on up to 1910-13), giving us eight observations for each category.

The basis for classifying the goods was the Standard International Trade Classification (SITC) developed by United Nations Statistics. For full details of how we proceeded, see Appendix 1. However, there were a number of cases where judgement

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<sup>5</sup> We would have liked to further break down the data into intermediates and final goods, but this proved impossible given the sources available to us.

was required in order to allocate particular commodities between categories, and this is particularly the case where ‘exotics’ are concerned. The rationale for including these as a separate category is that there is no reason to suppose that a tariff on tea or coffee would influence growth either positively or negatively. We admit that in general equilibrium, any tax will have an effect on welfare, expenditure, and factor prices (at least in models where the demand for non-tradables can influence factor markets). Once factor prices have been affected, it is easy to think of mechanisms whereby growth might be affected as well. It is also the case that the consumption of goods such as tea and coffee has been credited with boosting growth during the ‘Industrious Revolution’ of the 18<sup>th</sup> century, for example giving consumers an incentive to work harder (see for example de Vries 1994). However, we are not aware of any author who has made a serious claim to the effect that tariffs on such commodities might have had an effect on economic growth in the late 19<sup>th</sup> century, one way or the other, and it seems to us that any such argument would be inherently implausible. Clearly, if a strong positive correlation between such tariffs and growth were uncovered, this would cast doubt on any causal interpretation of the positive tariff-growth correlation uncovered by the several papers mentioned above.

The problem that arises, however, is what goods to allocate to this category. Take for example wine, beer and spirits. There are several issues that arise here, as a glance at the controversy involving Nye (1991) and Irwin (1993) will reveal. First, wine is generally classified as an agricultural good, and it surely should be considered to be an agricultural good in those countries which produced it. However, Nye claims that British wine tariffs protected the domestic British beer and spirits industries. Should wine tariffs be regarded as protecting agriculture or industry? Might they be regarded as protecting agriculture in wine-producing countries, but industry elsewhere? Or should we, as Irwin urges, regard wine tariffs in a country like Britain as having had no protective effect, given that they were counter-balanced by domestic excise duties on beer and spirits? In that case, maybe wine tariffs (and possibly beer and spirit tariffs as well) should be regarded as revenue tariffs, and thus be allocated to the ‘exotics’ category?

Resolving these issues satisfactorily seems difficult, if not impossible, particularly in the context of a panel dataset for ten different countries with different production structures and cross-price demand elasticities. It is certainly beyond the scope of this

paper. We have therefore decided to allocate wine among the three categories in a number of different ways, and to see whether the choices we make affect the results. Our baseline assumption is that beer and spirits tariffs protected manufacturing, while wine tariffs protected agriculture in the five wine-producing countries in our sample (Australia, France, Germany, Italy and the United States). In the other five countries (Canada, Denmark, Norway, Sweden and the United Kingdom), tariffs on wine are either regarded as being revenue tariffs, or as protecting industry. The first specification is closer in spirit to Irwin (1993), while the second is closer in spirit to Nye (1991), but we would not want to make too much of this distinction given that we are looking at a range of countries other than the United Kingdom, which was the focus of those two papers.<sup>6</sup> The primary purpose of this exercise is to see to what extent the allocation of wine tariffs matters for our results, and we ask for these two authors' indulgence in using their names to label these exercises.

Another issue that we had to confront was how to allocate tariffs on agricultural raw fibres, such as cotton, silk and jute. Although jute was grown in India, it seems sensible to treat jute tariffs as agricultural, on the grounds that they presumably protected domestic hemp production (just as tariffs on cane sugar protected beet sugar producers). Similarly, we have treated tariffs on raw cotton and silk as agricultural in our baseline specification, and indeed both commodities were grown in particular countries in our sample (for example, cotton was grown in Australia and the United States, while silk-growing was an important activity in Italy). We did however try allocating raw cotton and silk to the exotics category. Happily, this made no difference to our results, as results not reported here show.

Figures 1 though 3 give the baseline average tariff data. By definition, the two baseline specifications are identical for agricultural tariffs, as well as for manufacturing and revenue tariffs in the case of wine-producers. As can be seen, the two specifications also yield very similar results for manufacturing and revenue tariffs in non-wine-producing countries. Figure 1 shows that agricultural tariffs were particularly high in the United States and Canada, while tariffs were also at times quite high in Germany,

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<sup>6</sup> And indeed, the Irwin-Nye debate concerned the period prior to the 1880s, whereas our data are mostly from the 1880s onwards.

Sweden, Italy and Norway. Consistent with the qualitative literature, tariffs were low and falling in Denmark, and were almost zero in the United Kingdom. Agricultural tariffs were relatively low in France as well. Figure 2 shows very high industrial tariffs in the three New World countries in our sample, with much lower tariffs in Europe, especially in the United Kingdom. Finally, Figure 3 shows particularly high revenue tariffs in Australia, France, Italy and the United Kingdom, while tariffs were considerably lower in Scandinavia and the United States. All three tariffs fluctuated considerably over time within individual countries. Agricultural and industrial tariffs were highly positively correlated in the sample as a whole: the correlation coefficient is 0.70 using either specification. On the other hand, the correlation between these two tariffs and revenue tariffs is negative, ranging between -0.23 and -0.34.

### **3. Econometric results**

Table 1 provides summary statistics for the variables used in the econometric analysis. Data on GDP and endowments come from Angus Maddison's website and O'Rourke (2000), while the tariff data were generated by us. We used a number of further control variables, including the primary product share of exports and railway density, which were taken from Clemens and Williamson (2004), and we thank those authors for providing us with their data. Full details of all the data sources are provided in Appendix 1 and the notes to Table 1. Since we have eight time periods, we can calculate growth rates between seven pairs of periods. Since we have data for ten countries, we thus have a small panel data set, with 70 observations in all. In all cases, we regress growth between two periods on average tariffs in the initial period.

Figures 4-6 show that while there is a positive bivariate correlation between GDP growth and both agricultural tariffs and manufacturing tariffs, the correlation between growth and revenue tariffs is close to zero. Of course, such simple bivariate correlations on their own tell us very little, although the fact that revenue tariffs are not positively correlated with growth is of some interest. Tables 2 and 3 thus regress per capita GDP growth on the initial agricultural, manufacturing and exotic tariffs, controlling for a variety of other variables. Tariffs are expressed as  $\log(1+t)$ , where  $t$  is the tariff rate.



Table 2 includes wine tariffs with exotics in non-wine-producing countries, while Table 3 includes them with industrial tariffs. As can be seen, it makes no difference which specification you use. In all cases the equations include time dummies (coefficients not reported), and either country fixed effects (equations 1 through 4) or, as a robustness check, random effects (equation 5). Including country fixed effects allows us to take account of country-specific factors influencing growth rates either positively or negatively, in a consistent fashion across time. Being able to do so is of course one of the major advantages of panel techniques, as compared with the cross-sectional approach often used in the literature (Harrison 1996). The time dummies are included so as to control for growth upswings and downturns that were common across countries. Robust standard errors are clustered by country.

Equation (1) in Tables 2 and 3 includes as additional controls the log of initial income, and growth in the capital-labour and land-labour ratios between the two periods. The log of initial income is negatively related to subsequent growth. Growth in capital-labour and land-labour ratios have been found in the past to be important determinants of growth in the late 19<sup>th</sup> century, a period of expanding frontiers and international factor flows (for a theoretical justification of the specification adopted here, see Taylor 1999). The coefficient on both variables is positive, as expected, although the coefficient on the land-labour ratio is occasionally statistically insignificant at conventional levels. These findings are robust across all specifications.

More to the point, in the context of the present paper, agricultural tariffs are negatively related to growth in equation (1), while manufacturing tariffs are positively related to growth. The coefficients are big. For example, taking the coefficients in Table 2, equation (1), a one standard deviation increase in agricultural tariffs is associated with a decline in growth rates of 0.37% per annum, or 26% of the mean annual growth rate in this sample of countries (1.45% per annum). A one standard deviation increase in industrial tariffs is associated with an increase in growth rates of 0.94% per annum, or 65% of the mean annual growth rate. On the other hand, while the coefficient on manufacturing tariffs is statistically significant, the coefficient on agricultural tariffs is statistically insignificant at conventional levels. These findings are also robust, in that they survive the addition of several other control variables in specifications (2) through

(4), while the coefficient on the manufacturing tariff becomes even larger in the random effects specification (equation 5).<sup>7</sup> Moreover, the findings are by definition robust to the inclusion of country and time fixed effects (country random effects in equation 5). This is important, given Irwin's (2002) argument that the overall positive tariff-growth correlation during this period is being driven by the fact that certain countries, particularly those in the land-abundant New World, had good growth prospects and also imposed high tariffs, for completely unrelated reasons (in particular, they relied on tariffs as a source of government revenue). If this were the only factor driving the overall correlation, then one should find no relationship between average tariffs and growth once country fixed effects have been introduced into the equation. O'Rourke (2000) found that the average tariff-growth correlation *increased* when country fixed effects were introduced, and here we similarly find that there is a significant positive correlation between manufacturing tariffs and growth, controlling for country fixed effects. Indeed, the present finding is stronger than that presented in O'Rourke (2000), since the relationship between disaggregated tariffs and growth appears to be robust to the inclusion of time dummies as well.<sup>8</sup>

The sign pattern of the tariff coefficients is consistent with theories of growth that argue that manufacturing is a source of growth in a way that agriculture simply is not. The results are also consistent with the notion that economies could grow during this period by transferring labour from agriculture to industry, which implies that while industrial tariffs should speed up growth, agricultural tariffs should retard it. Interestingly, there is no relationship between revenue or 'exotic' tariffs and growth, with the coefficients being extremely small and statistically insignificant. A spurious positive relationship between growth and overall average tariffs, driven by some need on the part of governments to raise revenues, might be expected to imply a positive correlation between revenue tariffs and growth, but that is not what these data show. The results in Tables 2 and 3 thus seem consistent with the empirical evidence presented by authors

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<sup>7</sup> This is a general finding. In subsequent tables, we adopt the fixed effects specification.

<sup>8</sup> We also tried including raw silk and raw cotton with exotics; the results (not reported here) were stronger, in that the negative coefficient on agricultural tariffs became statistically significant at conventional levels in certain specifications, while the coefficient on the manufacturing tariff was essentially unaffected.

such as Williamson (2006) in favour of the “industry-carries-growth view” (p. 147), as applied to this period. In our view, these results make it more likely that the overall tariff-growth correlation for this period was not some spurious artefact of the data, but rather reflected an underlying set of causal relationships linking trade, economic structure and growth.

Table 4 provides two more specifications in an attempt to gain extra insight into these relationships. The first two columns test whether these results might be due to a mechanism considered in O’Rourke (2000), namely that during late 19<sup>th</sup> century recessions, prices tended to fall. This would lead to average tariff rates rising, since many tariffs were specified in specific rather than *ad valorem* terms during this period (Crucini 1994, Irwin 1998). Thus, average tariffs would be particularly high during recessions, when output was below its long run potential level, and subsequent growth rates might consequently be expected to be high. This could lead to a spurious positive correlation emerging between tariff rates and growth. We thus constructed very crude proxies for average ‘specific’ tariffs for each commodity category, by multiplying our tariff variable by the aggregate price level (i.e. the GDP deflator) of the economy in question.<sup>9</sup> As can be seen, the negative and positive relationships between agricultural and industrial tariffs on the one hand, and growth on the other, survive this transformation of the data, with the negative coefficients on agricultural tariffs now becoming statistically significant. We also (in results not reported here) interacted the tariff variables with the business cycle variable used in O’Rourke (2000), and found that manufacturing tariffs were more positively related to growth during booms than during busts. This is also inconsistent with the hypothesis that the effects uncovered above are due solely to some recession effect.

The third and fourth regressions in Table 4 explore whether these correlations were driven more by developments within Europe, or within the land-abundant societies of the New World (Australia, Canada and the United States in our sample). The negative relationship between agricultural tariffs and growth appears to be a New World phenomenon, with the two variables being essentially unrelated in Europe. On the other

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<sup>9</sup> That is, the ‘specific’ tariffs are specified as  $\log(1+(p*t))$  where  $p$  is the aggregate price level and  $t$  is the tariff rate.

hand, the partial correlation between manufacturing tariffs and growth is positive in both Europe and the New World. While the effect is stronger in Europe, we cannot reject the null hypothesis that the two coefficients are equal. The overall positive correlation between manufacturing tariffs and growth is *not*, it would appear, being primarily driven by developments in the settler economies of the New World, but by events in Europe as well.

Finally, Table 5 runs the same regressions as before, but takes as the dependent variable per capita industrial growth, rather than GDP growth. Since there are no available Canadian industrial output figures for this period, our sample was limited to nine countries and 63 observations. As can be seen, manufacturing tariffs were strongly and positively correlated with industrial growth during this period, and the size of the relationship is, as might be expected, larger than the size of the relationship between manufacturing tariffs and aggregate growth. On the other hand, there is no relationship between agricultural tariffs and industrial growth in this sample of countries.

#### **4. Conclusion**

While correlation is not causation, the evidence presented here is consistent with the argument that the overall positive tariff-growth correlation in the 19<sup>th</sup> century was not spurious, but, rather, reflected underlying causal relationships that are consistent with particular economic theories. Manufacturing tariffs were positively related to growth, while agricultural tariffs were negatively related to growth (although the latter result is notably less robust than the former). This accords with a variety of theoretical arguments stressing the growth-promoting benefits of industry. Revenue tariffs were not related to growth at all: there is no evidence of a revenue-driven relationship between overall tariffs and growth emerging from these results. We stress again that these findings control not just for unobserved country-specific factors which influenced growth consistently across time, but for upswings and downswings in economic activity affecting all the countries in our sample. The positive relationship between manufacturing tariffs and growth was driven by European tariff experience just as much as, if not more than, by the New World, an important finding given the argument in Irwin (2002) that the overall tariff-growth correlation was due to developments on the prairies.



There is a limit to how hard we can lean on these data, given how small a sample we have, but given that constraint, our results seem remarkably robust. It would clearly be of great interest to generate disaggregated tariff information for this period for a greater range of countries, not just so as to expand the degrees of freedom available to us, but more importantly to see if the relationships which have been uncovered here can be generalised to other regions of the world. The work of Clemens and Williamson (2004) suggests that this is not necessarily the case, since they found strong regional asymmetries in the relationship between average tariffs and growth: it could well be that what was true in our sample of more or less affluent economies was not true for poorer regions of the world as well.

Expanding the sample to more countries is particularly important since, as Jeffrey Williamson (2006) among other has pointed out, globalization was a two-edged sword for developing countries during this period. On the one hand, falling transport costs allowed developing countries to expand their exports of primary products to core markets, and many countries, including Ghana, Burma and the settler economies of Latin America, did well out of this strategy. On the other hand, exposure to Northern industrial exports made it more difficult for such countries to develop indigenous industrial sectors, with their potentially growth-enhancing properties. Several Latin American countries such as Mexico and Brazil were adopting explicitly protectionist manufacturing tariffs by the end of this period, and Japan lost no time in following suit once she regained tariff autonomy beginning in the early 20<sup>th</sup> century. Given the fact that the developing world moved *en masse* to protectionism during the course of the 20<sup>th</sup> century, it would be of great interest to see whether manufacturing tariffs had any influence on growth, in either direction, in such countries prior to 1914. The evidence in Clemens and Williamson (2004) suggests that they probably didn't help, but without the sort of disaggregated data presented here it is difficult to be sure.

As economic historians, we are comfortable with the notion that particular economic policies may have different effects across time and space, depending upon the technological, economic or institutional environment. We do not expect that the positive correlation between manufacturing tariffs and growth uncovered here will turn out to be a relationship that is generally valid. For example, it might be that for this period,

protecting industry was equivalent to protecting ‘expanding sectors’, whereas industrial protection now typically protects ‘declining sectors’, with different effects.<sup>10</sup> We also stress that we are not making any welfare judgements in this paper. Many papers in the trade and growth literature derive positive relationships between protection and growth, but stress that this positive dynamic relationship has to be set against the static welfare losses implied by protectionism, and indeed that the relative sizes of these dynamic gains and static losses may vary dramatically over time. On a more mundane empirical note, as many countries found out during the 20th century, import substitution policies may give rise to an initial spurt of growth, which however eventually peters out when the limits of the internal market have been reached. Similarly, once all available agricultural labour has been reallocated to industry or services, this potential source of growth disappears. By focusing on five-year periods, in common with much of the empirical literature, we may have been picking up the short to medium run impact of protection, rather than the longer run effects. There thus remains much work to be done on these issues, but we have to start somewhere, and establishing that particular relationships can be found in the data for one particular group of countries in one particular period is, we believe, a useful exercise.

Hopefully this paper has at least convinced the reader of one, crucial point. Looking for correlations between average measures of protection and growth does not make a lot of sense. *What* you protect matters.

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<sup>10</sup> We are grateful to Alan Matthews for this suggestion.

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**Table 1. Summary statistics**

Variable	No. of obs.	Mean	Std. Dev.	Min	Max
Growth in GDP per capita	70	1.450693	1.153447	-2.270172	4.804844
Log of initial income	80	1.008502	0.3474569	0.4146048	1.632628
Growth in capital stock per capita	70	3.969406	2.529154	-0.073759	14.30703
Growth in land per capita	70	-0.665292	1.140661	-5.212086	2.536454
Log of 1+agricultural tariff ('Irwin')	80	0.0939384	0.0792585	0.0014415	0.3426353
Log of 1+manufacturing tariff ('Irwin')	80	0.1043856	0.0649612	0.0198441	0.2918865
Log of 1+'exotic' tariff ('Irwin')	80	0.2915925	0.1748516	0.0322793	0.8217117
Log of 1+agricultural tariff ('Nye')	80	0.0939384	0.0792585	0.0014415	0.3426353
Log of 1+manufacturing tariff ('Nye')	80	0.1065081	0.0638801	0.02002	0.2918865
Log of 1+'exotic' tariff ('Nye')	80	0.2960651	0.1819874	0.0322793	0.8217117
Primary product share of exports	80	0.6990827	0.2784947	0.1102907	0.9709091
Railway density	80	0.0646071	0.0570024	0.00079	0.1923967
Import share of GDP	80	0.1980493	0.0796729	0.0432417	0.3510334
'Specific' agricultural tariff ('Irwin')	80	2.081643	0.8504659	0.1249878	3.567538
'Specific' manufacturing tariff ('Irwin')	80	2.328968	0.5461704	1.093558	3.38631
'Specific' 'exotic' tariff ('Irwin')	80	3.377084	0.7068076	1.325457	4.861794
'Specific' agricultural tariff ('Nye')	80	2.081643	0.8504659	0.1249878	3.567538
'Specific' manufacturing tariff ('Nye')	80	2.360279	0.5205983	1.160033	3.38631
'Specific' 'exotic' tariff ('Nye')	80	3.39212	0.7001797	1.325457	4.861794
Industrial growth	63	2.293594	1.982295	-2.313349	6.624567

Source: see Appendix 1 for details of how the tariff data were constructed. GDP growth, population growth and initial income were taken from Angus Maddison's website, <http://www.ggdc.net/maddison/>. Capital stock growth, land growth and the business cycle indicator were taken from O'Rourke (2000). The primary product share of exports and railway density were taken from Clemens and Williamson (2004). The specific tariff data were constructed by taking the log of one plus (the tariff rate multiplied by the GDP deflator), with the latter being taken from O'Rourke (2000). The import share of GDP was based on the data for nominal GDP detailed in O'Rourke (2000), and the following sources for nominal imports: Gammelgård (1985, Table 4) for Denmark; Lévy-Leboyer and Bourguignon (1990) for France; Hoffmann (1965, Table 127) for Germany; ISTAT (1958) for Italy; Statistics Norway (1994, Table 18.1) for Norway; Johansson (1967, Table 51) for Sweden; Mitchell (1988, p. 453) for the United Kingdom; Mitchell (1993, Table E1) for Canada; U.S. Department of Commerce (1975, series U193) for the United States; and Mitchell (1995, Table E1) for Australia. Industrial output indices are taken from Mitchell (1992, 1995), Hansen (1974), Davis (2004), Butlin (1962) and from Norwegian data graciously provided by Ola Grytten.

**Table 2. Growth and the structure of protection**

**Wine in agriculture in wine-producing countries; wine in "exotics" in non-wine-producing countries**

	(1)	(2)	(3)	(4)	(5)
Method	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Random effects
Log of initial income	-6.1203*** [1.1660]	-5.8261*** [1.1964]	-5.4014*** [1.4555]	-5.3138*** [1.4274]	-3.2254*** [0.6764]
Growth in capital-labour ratio	0.1980** [0.0780]	0.2230** [0.0770]	0.2493** [0.0776]	0.2466** [0.0820]	0.2570*** [0.0678]
Growth in land-labour ratio	0.308 [0.1853]	0.3142* [0.1658]	0.2940* [0.1356]	0.2757* [0.1399]	0.2847*** [0.0843]
Log of agricultural tariff	-4.7264 [4.9593]	-7.1314 [5.5794]	-8.586 [5.7435]	-8.3929 [5.7309]	-2.3271 [2.4209]
Log of manufacturing tariff	14.4431** [6.3679]	16.6403** [5.4469]	15.5445** [5.5218]	15.3193** [5.6541]	24.1977*** [5.8607]
Log of "exotic" tariff	-1.3795 [0.8061]	-0.4134 [0.9487]	0.7412 [0.9751]	0.9089 [0.8528]	-0.0218 [0.4097]
Primary product share of exports		-8.7651** [3.5233]	-11.1558*** [3.0349]	-10.1299** [3.6907]	-2.9384*** [1.0359]
Railway density			18.2274 [12.4461]	17.5659 [13.6915]	7.5262*** [2.1230]
Import share of GDP				4.0233 [6.0280]	7.3242*** [1.7180]
Constant	8.1852*** [1.3455]	13.2865*** [3.6941]	12.6533*** [3.1430]	11.0409** [3.6470]	2.7299** [1.2176]
Observations	70	70	70	70	70
Number of countryid	10	10	10	10	10
R-squared	0.5	0.58	0.6	0.6	

Source: see text.

Notes: Dependent variable is per capita GDP growth. Robust standard errors in brackets, clustered by country. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All regressions include time fixed effects (coefficients not reported).

**Table 3. Growth and the structure of protection**

**Wine in agriculture in wine-producing countries; wine in manufacturing in non-wine-producing countries**

	(1)	(2)	(3)	(4)	(5)
Method	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Random effects
Log of initial income	-6.3873*** [1.3362]	-5.6127*** [1.1554]	-5.1393*** [1.4371]	-5.1242*** [1.4001]	-3.0263*** [0.6236]
Growth in capital-labour ratio	0.1928** [0.0790]	0.2243** [0.0776]	0.2530** [0.0781]	0.2487** [0.0830]	0.2579*** [0.0681]
Growth in land-labour ratio	0.3209 [0.1841]	0.3054 [0.1712]	0.2835* [0.1377]	0.2687* [0.1418]	0.2885*** [0.0848]
Log of agricultural tariff	-4.8649 [4.9303]	-6.7496 [5.5914]	-8.4091 [5.8489]	-8.2482 [5.8322]	-2.0076 [2.3769]
Log of manufacturing tariff	13.6844* [6.1966]	15.4134** [5.5513]	14.4613** [5.5492]	14.2816** [5.5988]	22.5244*** [5.3809]
Log of "exotic" tariff	-1.6459 [0.9655]	-0.2153 [0.9924]	1.0323 [0.8899]	1.1037 [0.8431]	-0.0302 [0.4648]
Primary product share of exports		-8.5609** [3.6183]	-11.4259*** [3.1240]	-10.3708** [3.8369]	-2.7150*** [0.9925]
Railway density			19.3722 [12.0874]	18.3785 [13.8541]	7.5317*** [2.2672]
Import share of GDP				3.9128 [6.0983]	6.2339*** [1.6021]
Constant	8.6961*** [1.5768]	12.8827*** [3.5038]	12.3643*** [2.9903]	10.9048** [3.5044]	2.6628** [1.2314]
Observations	70	70	70	70	70
Number of countryid	10	10	10	10	10
R-squared	0.51	0.57	0.59	0.6	

Source: see text.

Notes: Dependent variable is per capita GDP growth. Robust standard errors in brackets, clustered by country. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All regressions include time fixed effects (coefficients not reported).

**Table 4. Further robustness checks**

	(1) 'Irwin'	(2) 'Nye'	(3) 'Irwin'	(4) 'Nye'
Log of initial income	-6.8592*** [2.0171]	-7.0272*** [2.1089]	-5.1805*** [1.3388]	-5.0091*** [1.3267]
Growth in capital-labour ratio	0.2017** [0.0747]	0.1967** [0.0770]	0.2700*** [0.0763]	0.2729*** [0.0776]
Growth in land-labour ratio	0.3244** [0.1278]	0.3317** [0.1309]	0.2127 [0.1602]	0.2082 [0.1614]
Primary product share of exports	-7.938 [4.5202]	-7.1764 [4.6742]	-8.7648* [4.3377]	-8.6767* [4.6084]
Railway density	10.3625 [15.6869]	10.78 [16.0302]	13.5232 [17.4484]	14.5949 [17.6581]
Import share of GDP	1.3361 [7.4360]	2.3883 [7.6064]	3.5912 [5.2027]	3.9825 [5.4156]
'Specific' agricultural tariff	-0.8113* [0.4240]	-0.8492* [0.4362]		
'Specific' manufacturing tariff	1.0866* [0.5017]	1.0297* [0.4881]		
'Specific' 'exotic' tariff	-0.3919 [0.3717]	-0.4694 [0.4430]		
Log of agricultural tariff, Europe			0.3267 [3.7313]	0.3496 [3.9303]
Log of agricultural tariff, New World			-13.4329 [10.0434]	-13.304 [10.2401]
Log of manufacturing tariff, Europe			21.0564** [7.5027]	19.3371** [7.2161]
Log of manufacturing tariff, New World			17.0538* [8.8196]	16.3926 [8.9757]
Log of 'exotic' tariff, Europe			0.065 [1.1361]	0.3272 [1.1243]
Log of 'exotic' tariff, New World			1.2988 [1.5416]	1.4639 [1.5621]
Constant	14.3884** [5.7528]	14.3170** [5.7754]	9.8021** [3.4066]	9.3515** [3.3101]
Observations	70	70	70	70
Number of countryid	10	10	10	10
R-squared	0.62	0.62	0.62	0.62

Source: see text.

Notes: Dependent variable is per capita GDP growth. Robust standard errors in brackets, clustered by country. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All regressions include country and time fixed effects (coefficients not reported).

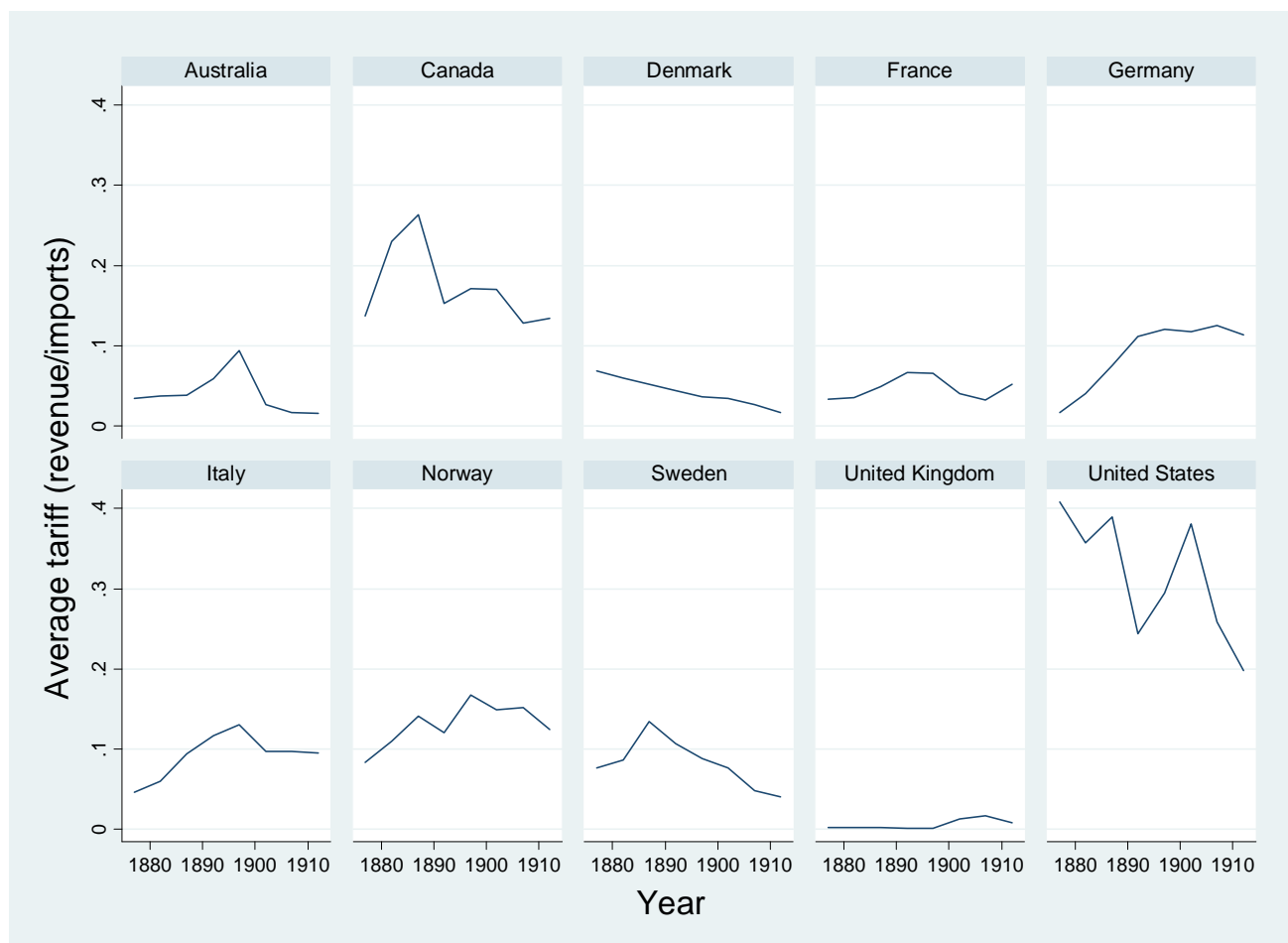
**Table 5. Industrial growth and the structure of protection**

	(1)	(2)
Tariffs	Irwin	Nye
Log of initial income	-17.8433*** [3.8531]	-17.6569*** [4.0192]
Growth in capital-labour ratio	0.0995 [0.2671]	0.0985 [0.2699]
Growth in land-labour ratio	0.9324*** [0.2026]	0.9177*** [0.2095]
Log of agricultural tariff	-1.6173 [6.8091]	-0.7462 [7.1284]
Log of manufacturing tariff	32.2393** [12.9059]	29.3794** [12.3196]
Log of "exotic" tariff	-5.8256** [2.1535]	-5.4640** [2.1009]
Primary product share of exports	-20.0856** [7.9345]	-17.9159* [8.7392]
Railway density	43.3185 [27.1061]	46.1425 [28.0108]
Import share of GDP	-28.9825 [17.4041]	-25.4552 [17.3302]
Constant	38.2317*** [10.6371]	35.7288** [10.6515]
Observations	63	63
Number of countryid	9	9
R-squared	0.54	0.53

Source: see text.

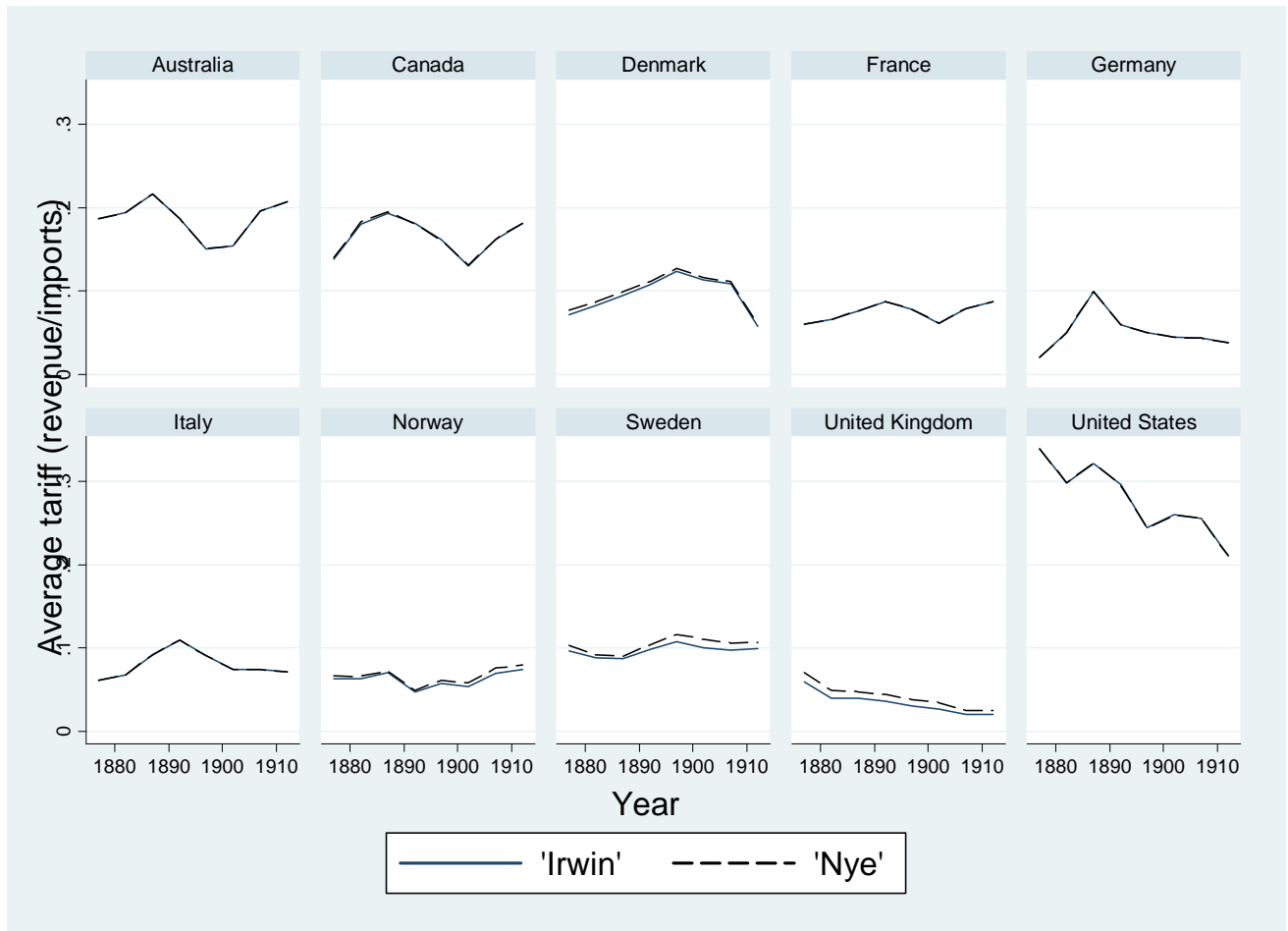
Notes: Dependent variable is per capita industrial growth. Robust standard errors in brackets, clustered by country. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All regressions include country and time fixed effects (coefficients not reported).

**Figure 1. Agricultural tariffs, 1875-1913**



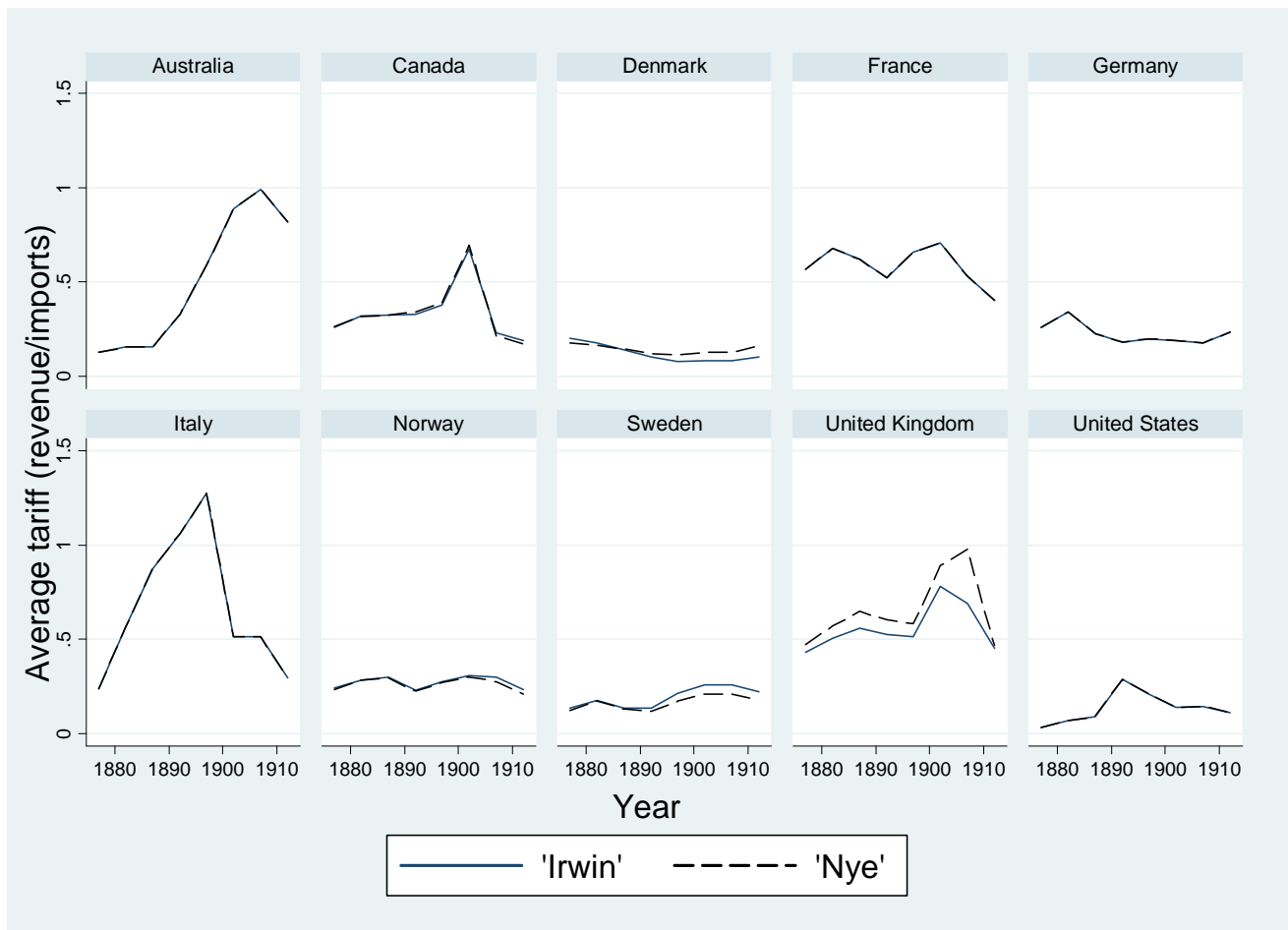
Source: see Appendix 1.

**Figure 2. Manufacturing tariffs, 1875-1913**



Source: see Appendix 1.

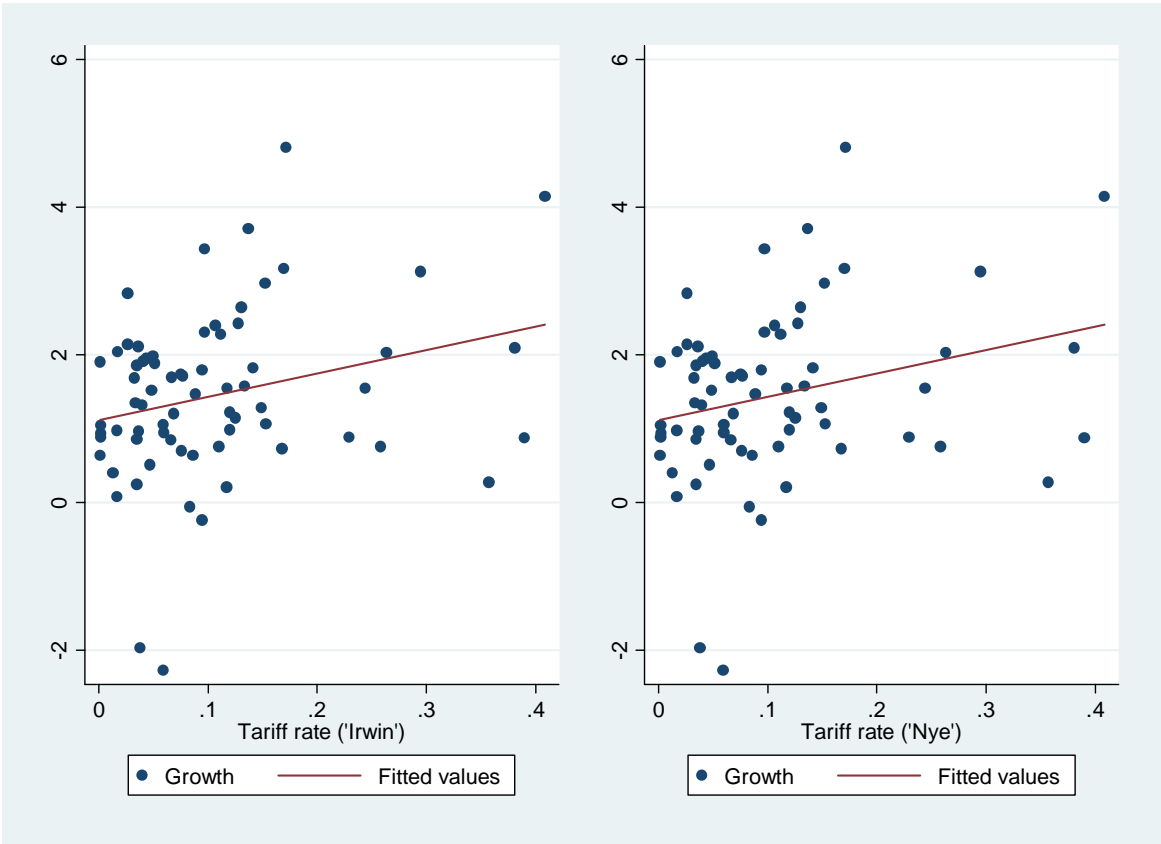
**Figure 3. 'Exotic' or revenue tariffs, 1875-1913**



Source: see Appendix 1.

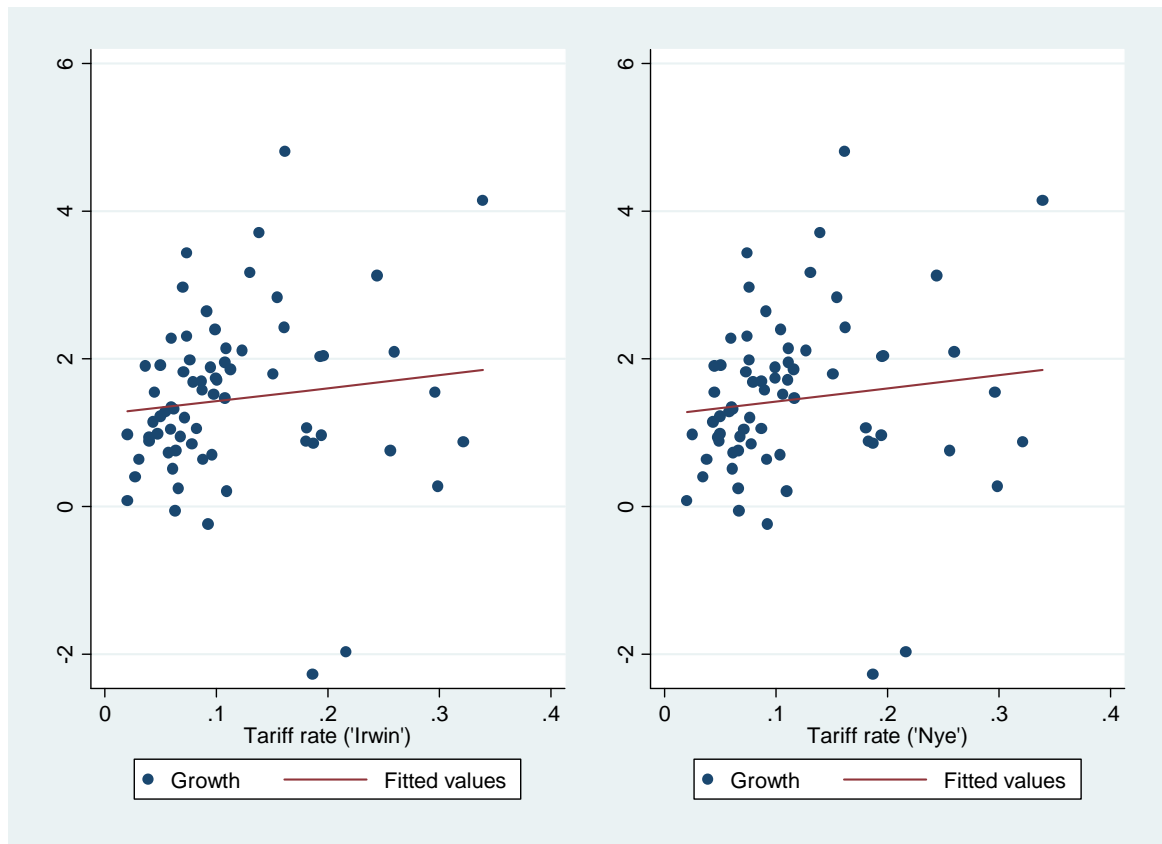


Figure 4. Growth and agricultural tariff rates



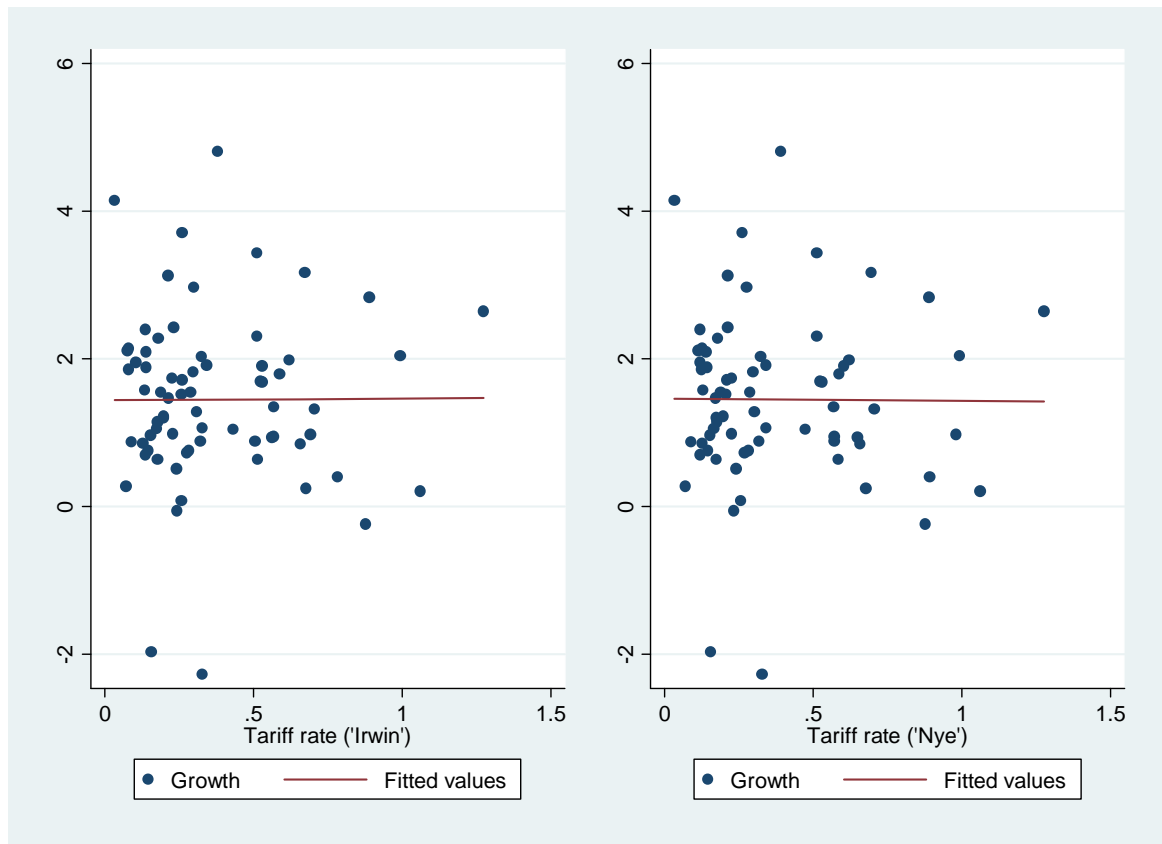
Source: as in Table 1.

**Figure 5. Growth and manufacturing tariff rates**



Source: as in Table 1.

**Figure 6. Growth and ‘exotic’ or revenue tariff rates**



Source: as in Table 1.

## **Appendix 1. The disaggregated tariff data**

### ***General:***

We estimated average tariffs by dividing customs revenues by imports. Goods are categorized into three groups: agricultural, manufactured and ‘exotic’ goods.

We used the Standard International Trade Classification (SITC) to assign the goods to different groups. We used the following specifications to calculate the three categories of tariffs, with the differences depending on how wine, raw cotton and raw silk are categorized:

Baseline 1:	Agriculture, including raw silk, raw cotton, plus wine in Germany, France, Italy, Australia and USA, because they are wine producers. Exotics, including wine in the non-wine-producers (Canada, Denmark, Norway, Sweden, and United Kingdom) Manufactures, including beer and spirits
Baseline 2:	Agriculture, including raw silk, raw cotton, plus wine in Germany, France, Italy, Australia and USA, because they are wine producers. Exotics Manufactures, including beer and spirits, and wine in the non-wine-producers (Canada, Denmark, Norway, Sweden, United Kingdom)

In the few cases where the overall figures for imports or customs revenues exceed the sum of the individual goods reported, we increased the totals for our three categories proportionally so that they summed to the correct total. Imports or customs revenues classified as “others” or “other goods” were proportionally divided between our three categories.

Below we give country-specific details of how we classified particular commodities, other than beer, spirits and wine.

**United Kingdom:** Data were taken from the *Statistical Abstract for the United Kingdom*, HMSO, London. Values for spirits and wine are given for imports and customs revenues for all years.

Imported goods classified as agriculture:

Animals not for food; currants; feeding stuffs for animals; fruits preserved in sugar; glucose; grain and flour; hides and skins undressed; horses; live animals for food; meat; molasses; other animals; other dried or preserved fruit; other food and drink (non-dutiable); other sorts of refined sugar; raisins; raw cotton and cotton waste; seeds and nuts for oil, fats resins and gums; sugar refined; sugar unrefined, beetroot; sugar unrefined, cane and other sorts; wood and timber; wool, raw and waste and rags; raw silk (NB: in this data appendix raw silk and raw cotton are classified with agriculture, but as already mentioned in the 3<sup>rd</sup> sensitivity specification they are shifted to the ‘exotics’ category)

Imported goods classified as manufactures:

Apparels; chemicals; cocoa preparations; drugs, dyes and colours; coal; coke and manufactures fuel; cotton yarns and manufactures; cutlery, hardware implements and instruments; earthenware, glass abrasives etc.; electrical goods and apparatus; iron and steel and their manufactures; iron ore and scrap; leather and leather manufactures; machinery; manufactures of other textiles; milk, condensed sweetened; manufactures of wood and timber; miscellaneous raw materials; non-ferrous metal and their manufactures; non-ferrous metalliferous ores and scrap; non-metalliferous mining and quarry products; oils, fats, resins, manufactured; other manufactures; other textile materials; paper and cardboard; paper making materials; rubber manufactures; other articles; ships; silk and silk manufactures (raw silk is listed separately); vehicles including locomotives ships and aircraft; woollen and worsted yarns and manufactures

Imported goods classified as exotics:

Cocoa, raw; rubber; coffee; tea; tobacco

Customs revenues classified as agriculture:

Sugar and molasses; corn, meal and flour; currents, raisins and dried fruits

Customs revenues classified as exotics:

Tea; coffee/cocoa/chicory; tobacco and snuff;

Customs revenues classified as manufactures:

Other manufactured articles; miscellaneous receipts; motor spirit

**France:** The data were taken from *Tableau General du Commerce de la France avec ses Colonies et les Puissances Etrangères*, Direction Generale des Douanes, Paris. Values for spirits, beer and wine are given for imports and customs revenues for all years.

Imported goods classified as agriculture:

Bones, hoofs, horns of livestock/cattle; cattle; cereals; cheese and butter; common wood; flax; fruit; game and poultry; eggs; hemp; hops; horses; jute; meat, fresh and salted or otherwise preserved; oil producing fruits and seed; oilcake of oil seeds; olive oil; plaits or braids of straw; rice; scrap wool; sea fish; seed oil and oil from fruit and peanuts; seeds to sow; skins and furs; sugar from others; sugar from French colonies; vegetables and their flour; silk and floss of silk; cotton wool; volatile oil and essence of vegetables; wool in bulk

Imported goods classified as manufactures:

Arms; carriages; cast iron of all sorts; coal - raw and charred; collector's items out of business; copper; cotton thread not including scrap thread; fabric of linen or hemp; fancy goods, brushes, fans and buttons; fat of all sorts; feather trimmings; furs, manufactured; gold or silver plate and jewellery; hats; indigo; iron, cast iron and steel; lead; leather or skin goods; machinery and apparatus; manufactured leather; medicinal goods; mother of pearl; oil and paraffin etc.; ore of all sorts; other merchandise, paper; paper, cardboard, books and prints; plates of raw whale bone; postal parcels; pottery, glasses and crystal; raw platinum in bulk; raw tin; rubber goods; sodium nitrate and potassium nitrate; stone and clay for arts and crafts; woven silk; sulphur; thread of linen or hemp; tools and metalwork; watches; wool thread, woven cotton; woven wool; zinc

Imported goods classified as exotic:

Coffee; cocoa; tobacco leaves; rubber and gutta-percha raw; exotic wood; guano and other manure; saffron; tobacco manufactures or only prepared /made up

Customs revenues classified as agriculture:

Cattle; cereals; cheese; common wood; fish, fresh, salted, dried and preserved; fruit; game and poultry, eggs; horses; meat, fresh and salted or otherwise preserved; noodles;

rice; seed oil and oil from fruit and peanuts; sugar from others; sugar from French colonies; vegetables and their flour; wool in bulk

Customs revenues classified as manufactures:

Chemical products; coach/car body; coal - raw and charred; cotton thread not including scrap thread; fabric of linen or hemp; fancy goods, brushes, fans and buttons; iron, cast iron and steel; lead; leather or skin goods (with manufactured fur); machinery and mechanisms; manufactured leather; oil and paraffin etc.; other merchandise; paper and its products; petroleum; pottery, glasses and crystal; rubber goods; thread of linen or hemp; tools and metalwork; woven cotton; woven silk; woven wool

Customs revenues classified as exotics:

Coffee; tobacco leaves; cocoa; pepper and spice; tea; tobacco manufactures or cigarettes

**Norway:** Data were taken from *Statistisk Aarbok for Kongeriket Norge*, Det Statistisk Centralbyraa, Kristiania. Wine and spirits are separately listed for custom revenues, but aggregated as 'drinks' in imports. We assume equal tariff rates and use the share of custom revenues for wine, beer and spirits to estimate the import shares.

Imports classified as agriculture:

Cereals; edible animal products; fruit, vegetables; hair feathers, skin and other animal products; live animals; timber

Imports classified as manufactured:

Dyestuff and prepared paints; manufactures of fats and oils etc.; manufactures of hair and skin; manufactures of metal; metal, crude and semi manufactured; mineral products; minerals, crude materials; other manufactures; other vegetable materials and manufactures thereof; other articles; paper and manufactures thereof; ships, vehicles, machinery; spinning materials; textile manufactures; woods products; yarns, thread etc; fats, oils, rubber and similar materials (divided by two, the other half is in exotics)

Imports classified as exotic

Groceries from colonies; fats, oils, rubber and similar materials (divided by two, the other half is in manufactures)

Customs revenues classified as agriculture:

Cereals; fruits; rice; sugar; syrup

Customs revenues classified as manufactures:

Fur, manufactured; metal works; other goods; petroleum and paraffin; salt; varnish; woven goods; yarn

Customs revenues classified as exotics:

Other goods from colonies; coffee; tea; tobacco; tropical spices

**Italy:** Data were taken from *Movimento Commerciale*, Ministero delle Finanze, Direzione Generale delle Gabelle, Rome. The reported good categories for imports and customs are identical.

Imports and customs classified as agriculture:

Animals, products and skins of animals not included in other categories; cereals, flours, pastes and vegetable products not included in other categories; silk; linen, jute; cotton; wood and straw; wool, horse hair and fur

Imports and customs classified as manufactures:

Chemical products, medical items, resins and perfumes; colours and products for colouring and tanning hemp, linen, jute, and other filamentous plants, excluding cotton; leather; minerals, metals and their products; paper and books; precious metals; stones, terracotta, crockery, glasses and crystals; various items; vehicles

Imports and customs classified as exotics:

Elastic rubber, and gutta-percha and their products, colonial products, drugs and tobaccos

**Denmark:** For 1875, 1876 the data were taken from Henrik Folde (1989), *Liberalisme og Frihandel 1814-1914*, Toldhistorisk Selskab and Niel Thomsen, *Industri Stat og Samfund 1870-1939, Dansk industri efter 1870, Bind 2*, Odense Universitetsforlag. From 1892 we used *Statistisk Årbog Danmark*. Tariff rates between 1876 and 1892 were interpolated. For 1876 and 1877, imports of wine, beer and spirits are aggregated in 'other food and beverages'. Customs revenues are covered in 'beverages'. Folde (1989) also provides tariff rates for beer and spirits for 1872. Under the assumption that tariff rates did not change and that the import shares of wine, beer and spirits as well as the total share of beverages in total imports were equal to the ones in 1890 it is possible to approximate the shares of customs revenues and imports for wine, beer and spirits.



Imports classified as agriculture:

For 1875, 1876:

Agricultural products; timber; butter; oil seeds; meat, cheese, eggs

From 1892:

Animal foodstuffs; cereal products; fodder and grain; grain flour; hair, fur, horns, bones, feathers and other animal materials and products of, and manure; live animals; plants of the field or garden; wood - worked or not; products of horticulture and fruit; tallow, oils, tar, rubber, gums, etc and their products (divided by three, with one third being allocated to each category)

Imports classified as manufactures:

For 1875, 1876:

Coal; glass ware; manufactured products; metal; salt; oil

From 1892:

Chemicals, fertilizer etc.; clothing; dyes, etc.; fabric from plant matter; iron/steel and products; linen or hair fabric; manufactures of plant matter; metals; minerals – manufactures; minerals, worked or not; other products of plant matter; paper and stationary; products of hair, fur, horns, bones, feathers and other animal materials; silk fabric; string and thread; textiles; wood – worked; ships, vehicles, machinery and instruments etc.; other products; tallow, oils, tar, rubber, gums, etc and their products (divided by three and one third in every category)

Imports classified as exotics:

For 1875, 1876:

Coffee; tea; tobacco

From 1892:

Foodstuffs- colonial and fruit; tallow, oils, tar, rubber, gums, etc and their products (divided by three, with one third being allocated to each category)

Customs revenues classified as agriculture:

For 1875, 1876:

Rice; lumber; sugar

From 1892:

Animals; cheese; fish; fruit; furs; hops; oils; rice; feathers and downs; starch; sugar; wood and pulp

Customs revenues classified as manufactures:

For 1875, 1876:

Coal; glass ware; manufactured goods; metal; salt; oil

From 1892:

Artificial flowers; bicycles; cake; clocks, watches; clothing; coal and cokes; dyes, etc.; electrical equipment; fabric; glassware; glue; hats; instrument; jewellery and fancy goods; machines; mats (plaits) of inner bark; metals; paper and stationary; pharmaceutical products; pottery; powder; products of metalwork; perfume; rope; salt; ships and boats; shoes; soap; string and thread; tallow; toys; vehicles; other; wood and wood products (wood and pulp is a separate category, included above in agriculture); without class

Customs classified as exotics:

For 1875, 1876:

Coffee; tea; tobacco

From 1892:

Cocoa; coffee; spices; foodstuffs- colonial and fruit; tea; rubber; tobacco

**Sweden:** Data were taken from *Sveriges Officiella Statistik*, Statistiska Centralbyrån.

Imports and customs duties were given in 5-year averages from 1876/80 to 1906/10 and individually from 1911-14. Wine, beer and sprits are aggregated as “alcoholic drinks”.

We use the share of wine and spirits from the Danish imports to approximate imports for all specifications, presupposing that tariffs for wine and spirits were equal.

Imports classified as agriculture:

Animal fibres; cereals; diverse animals; fruit and horticultural products; live animals; other botanic material; other botanic products; silk; cotton; timber; other animal products

Imports classified as manufactures

Dyes; manufactures produced from animals; metal works; minerals; other articles; paper, carton and similar products; semi finished metal works; ships; cars; machines; instruments; talcum; tar and similar substances; textiles; textiles, raw; wood, manufactured and semi-manufactured; yarn and cables

Imports classified as exotics:

Groceries from colonies

Customs revenues classified as agriculture:

Cereals, sugar

Customs revenues classified as manufactures:

Iron and steel; machines; other merchandise; textiles

Customs revenues classified as exotics:

Green coffee, tobacco

**Germany:** Data were taken from *Statistik des Deutschen Reiches*.

Until 1895 tariffs were calculated using customs revenues divided by imports. After 1895 we know the tariff rates levied on different commodities. We calculate the (trade-weighted) average tariff rate for each category and multiply it by the share of dutiable imports in total imports for that category. For the years in which we calculate tariff rates using custom revenues divided by imports, imports contain values for wine, beer and spirits. In the customs revenues only wine appears. Furthermore, in the years from 1895 to 1914 there is a tariff rate for wine, but none for spirits and beer. No duties on beer and spirits appear, in either the early years or the later, although both sets of statistics are quite detailed, and there is no category such as 'drinks' which might cover beer and sprits. Thus it seems acceptable to assume zero tariff rates for spirits and beer.

Imports classified as agriculture (-1895):

Barley; bed feathers; beef skins; bone meal; bowels; bran; bristles; butter; calfskins; calves; cattle; caviar; cellulose; cheese; clover seeds; cork; cotton scrap; dried fish; dried fruits; dried nuts; eggs; feathers; firewood; fish oil; flax; floret silk; flour and other mill products; flowers; fresh fish; fruits; fruits and berries; fur; gallnut; goats and sheepskins without hair; grape; grass seeds; hair; hemp; herring; honey; hoops; horses; jute; lard; linen seed; linen oil; logs; maize; malt; meat; meat extract; oilcake (fodder); olive oil; olive oil in barrels; oats; oxen; oysters; peanuts; pigs; poppy seeds; potatoes; poultry; rapeseed; raw cotton; raw hares and rabbit skins; raw materials for baskets; raw sheep, lamb and goatskins; raw silk; resin; rice; rye; saccharose; sesame; sheep; sheep wool; silk; skin and fur for leather; straw; straw yarn; suckling pig; sugar; syrups and molasses;

bulls; timber; vegetable oil; water; wheat; wood; wood different kinds; wood for baskets; young cattle

Imports classified as manufactures (-1895):

Alabaster and marble; albumin; alizarin; alkaloid; aluminium; ammoniac; aniline; aniline colour; animal carbon; anthrax; artificial wool; artificial fertilizer; bicarbonate; black coal; books; borax; bricks; brown coal; brushes; potassium; kaolin; catechu; caustic soda; cement; chinaware; quinine; chlorinated lime; clinker; clothes and underwear; coal; coal oil; coloured glass; coloured silk; coloured wood; colours; cooker; copper; copper engraving; copper in bars; coppersmith products; cotton products; cotton textiles; cotton yarn; cotton, combed and coloured; crayons and pencils; desks; dry goods; dyewood; explosives; feathers manufactured; fat in barrels; fine leather ware; furniture; glass; gemstones; gloves; glue; goats and sheepskins, manufactured and leather; gold manufactured; gunpowder; guns; indigo; instruments; iron and copper ore; iron and steel products; iron manufactured; iron ore; iron raw; iron semi-manufactured; iron wire; iodine; jute and linen yarn; jute and linen products; jute textiles; cobalt; coke; lead; leather of all sorts; lights of all sorts; lime; linen yarn; locomotives; marmalade; machines and parts of machines; matches; mirror glass; oil; oilcloth; other goods; other mineral oils; other ores; varnish; paintings and drawings; paper; paper hangings; paper raw; petroleum; phosphate; pianos; pitch; plum and zinc products; plumb, potash; pottery; product of mother-and-pearl; products of leather; products of linen; rags of all sorts; raw tin; rubber products; rubber varnish; salt; saltpetre; saltpetre acid; salt acid; schist; shoes; silk half manufactured; silk products; silk thread; silver and gold plates; soap; soda; stearin, palatine and paraffin; starch; steel pipe; stones; sulphur; sulphuric acid; tallow; tanning agent; tartar; telegraphy instruments; timber preservative; turpentine; timber, semi-manufactured; tin plate; toys; train tracks; trains; vehicles; vitriol; watches; whale products; white glass; white lead; windows; wood for barrels; wood manufactured; wool combed; woollen products; woollen yarn; vinegar

Imports classified as exotics (-1895):

Cigarettes; ivory, raw; tobacco, raw; camphor; cinchona; coffee; cocoa; gold raw; guano; rubber; rubber and gutta-percha; palm seeds; pepper; spices; tropical fruits; tropical fruits, dried; tobacco, manufactured; tea

Customs revenues classified as agriculture (-1895):

Beef and sheep; butter; cattle; cheese; eggs; fruit; grapes; herring; honey; hops; horses; lard; meat; mussels; pigs; rice; sugar; timber; edible oil; wheat

Customs revenues classified as manufactures (-1895):

Cocoa, chocolate and sweets; cotton yarn; drugs and colours; fats and oils; leather and leather products; linen yarn; machines and vehicles; milk products and bread; petroleum; pottery; iron; silk manufactures; salt; iron raw; woollen yarn;

Customs revenues classified as exotics (-1895):

Coffee; tobacco; tropical fruits; spices; tea; cocoa; oil fruit

Tariff rates classified as agriculture:

Butter and margarine; cattle and sheep; cheese; cotton; edible oils; eggs; fruits, berries and nuts; grapes; herring; honey; hops; horses; lard; linen and other similar goods; malt; meat; oysters and other seafood; rice; seeds, cereals; silk; swine; wood; wool raw

Tariff rates classified as manufactures:

Cocoa, chocolate and pastries; cotton, manufactured; drugs and colours; fuel; iron raw; leather and leather manufactured; machines and apparatus; metal manufactured; oils; pottery and glass manufactures; products of mills and bakery; wood manufactured and other; wool, manufactured

Tariff rates classified as exotics:

Cocoa; coffee; oil fruits; spices; tea; tobacco manufactured; tobacco raw; tropical fruits, fresh and dried

**Australia:** Australia only became a united federation in 1901. The *Official Year Book of the Commonwealth of Australia* starts in 1900. Thus we use the data for Victoria, as published in the *Victorian Year-Book*, Commonwealth Bureau of Census and Statistics, Victoria Office for years prior to 1898. Missing years are interpolated.

Wine, beer and spirits are listed in imports and customs revenues for Victoria. For Australia there is neither wine nor spirits listed in either group. We therefore calculate the three categories without special regard to alcoholic drinks and extrapolate Victoria's rates.

Imports classified as agriculture:

Victoria:

Butter and cheese; fish; flour and biscuits; fruits (incl. currents and raisons.); grain – oats; grain - other (including malt and rice); grain- wheat; hides, skins and pelts; hops; live stock; meats - fresh, preserved and salted; sugar and molasses; silk; cotton; timber; wool;

Australia:

Animal substances, mainly unmanufactured which are not foodstuffs; foodstuffs of animal origin excluding live animals; foodstuffs of vegetable origin; live animals; vegetable substances and non-manufactured fibres; wood and wicker both raw and manufactured (half in agriculture, half in manufactures);

Imports classified as manufactures:

Victoria:

Books; musical instruments; watches, clocks and watch-making materials; cutlery; building materials; furniture and upholstery; drugs and chemicals; carpeting; drapery; apparel and slops; bags and sacks (including woolpacks); candles; paper including paper bags; oil of all kinds; coal; earthenware, brown ware and chinaware; iron and steel (exclusive of railway rails, telegraph wire, etc.); fancy goods; stationery; machinery; sewing machines; tools and utensils; matches; paints and colours; woollens and woollen piece goods; linen piece goods and manufactures; haberdashery; boots and shoes; gloves; hats, caps, and bonnets; hosiery; millinery; leather, leather ware and leather cloth; woodenware; glass and glassware; jewellery; lead ore, pig pipe sheet; manufactures of metal; tin; nails and screws; plated wire; hardware and ironmongery; oilmen's stores

Australia:

Apparel, textiles and various manufactured fibres; beverages, non-alcoholic only and the substances used in making them; drugs, chemicals and fertilisers; earthenware, cements, china, glass and stoneware; jewellery timepieces and fancy goods; leather and manufactures of leather together with all substitutes thereof and also India rubber and India rubber manufactures; metals partly manufactured; metals, manufactured including machinery; metals, unmanufactured and ores; miscellaneous; oils, fats and waxes; optical, surgical and scientific instruments; paints and varnishes; paper and stationery; stones and minerals used industrially; wood and wicker both raw and manufactured (half in agriculture, half in manufactures)

Imports classified as exotics:

Victoria:

Coffee; opium; tea; tobacco, cigars, snuff

Australia:

Tobacco and all preparations thereof

Customs revenues classified as agriculture:

Victoria:

Dried and preserved fruits and vegetables; hops; live stock; malt; rice; sugar and molasses

Australia:

Agricultural products; wood, wicker and cane; sugar

Customs revenues classified as manufactures:

Victoria:

Coffee, chicory, cocoa and chocolate (divided by two, one half in exotics, one half in manufactures); all other articles; articles subject to ad valorem duties

Australia:

Apparel and textiles; drugs and chemicals; earthenware; jewellery etc.; leather etc.; metals and machinery; musical instruments; miscellaneous articles; narcotics; oils, paints, etc.; paper and stationery; stimulants; vehicles

Customs revenues classified as exotics:

Victoria:

Cigars; coffee, chicory, cocoa and chocolate (divided by two, one half in exotics, one half in manufactures); tobacco and snuff; opium; tea

Australia:

Special goods

**Canada:** Imports and customs revenues from 1877 to 1903 are taken from the *Statistical Yearbook*. After 1903 the data for customs revenues are only available on a high level of aggregation or by country. However, the trade volumes of the sessional papers of Canada provide customs revenues for the later years.

Imports classified as agriculture:

Animals; bones; breadstuffs; bristles; broom corn; butter; cane and rattans; cheese; corkwood; eggs; feathers; felloes of hickory wood; fibre; vegetables; fish; flowers; fruits; fruits, preserved; fruits, dried; fur skins; fur, glucose and saccharine; grease; grease, rough; hair, cleaned; hair, horses; hatters' furs; hay; hemp; hickory and oaks; hickory billets; hides and skins; honey; hops; ivory nuts; lard; logs and round unmanufactured; timber; lumber and timber; malt; meat; molasses; oil, animals; oils, vegetable; other agricultural products; other vegetable produce; pickles; plants and trees; rennet; sausage; seeds; silk, raw; straw; sugar and syrups; sugar, maple; vegetables; wood for fuel; wool

Imports classified as manufactures:

Army, navy material; articles for use of the governor general; bacteriological products; articles for the use of the dominion government; goods ex-warehoused for ships stores; fancy goods; fence posts; handle, stave; hickory spokes; hubs for wheels; manufactures; milk, condensed; mineral produce; miscellaneous; models of inventions and other improvements; others; paintings in oil or water colours; settlers' effects; shovel handles; sponges; wax

Imports classified as exotics:

Chicory; cocoa beans; cocoa nuts; coffee, green; coffee, roasted; spices; tea; tobacco; tobacco, unmanufactured

Customs revenues classified as agriculture:

Animals and food, total breadstuffs, grain, grain products, feather undressed, fish, flax, hemp and jute, dried fruits, fruits green, furs, hair, hay, honey, hops, lime, milk, mineral waters, mustard, fish oil, animal, vegetable, lubricating oils, plants and trees, provisions (agricultural), seeds & bulbous roots, sugar syrup and molasses, vegetables, waste or shoddy from cotton, beeswax, yeast

Customs revenues classified as manufactures:

Goods in crude condition, wholly or partly manufactured to be used in industry; manufactured articles; vinegar, salt, ashes, asphaltum, bagatelles tables or board, tallow, bags with contained cement, bags, barrels and other coverings, baking powders, balls, baskets, belts, bells and gongs, belts of all kind, billiard tables, shoemakers ink, blind of wood, blueing, laundry blueing, boats, ships, books, periodicals, bolsters, pillows, boot, shoe and stay laces of any material, boots, shoes and slippers, braces and suspenders,



total bricks, clays and tiles, crapes, British gum, dextrin, brooms, buttons, candles, total carpets, 'carpets sweepers', total carriages, cash registers, celluloid, cement, church vestments, clocks, clothes wringers, cloth, coffee, chicory and chocolate (divided by three, two thirds in exotics, one third in manufactures); coke, coal, collars, combs for dresses, cordage and twine and manufactures of, cordage, cotton, corsets, corset clasps, costumes, cotton manufactures, curtains, curling stones, cyclometers, damaged goods, chemicals, earthenware and china, elastic round, electric apparatus, embroideries, emery wheels, fancy goods, featherbone in coils, feathers bone, fertilizers, fireworks, articles for fishery, foundry facing of all kinds, total fruits canned, glass, gloves, glue, grasses, fibres, grease, gunpowder, hats, caps and bonnets, ink, jewellery, knitted goods of every description, laces, leather and manufactures of, lime juice, machine card clothing, total marble, mattresses, brass and manufactures of, copper, metals, mosaic flooring, musical instruments, mineral oils, oil cloth etc, optical and philosophical instruments, packages, parcels, paintings, paints and colours, papers and manufacturers, paraffin wax, pencils, pens, penholders, rulers etc, perfumes, pomades etc, photographic dry plates, picture and photograph frames, pickles and sauces, plates (engraver's), pocket books, purses, musical instrument cases, precious stones, pulleys, regalia and badges, ribbons, rugs, sails, sand paper, sausage casings, ships etc, signs and letters, silk manufactured, slate, soap, sponges, starch, stearic acids, stone and manufacturers of, tape lines, teeth artificial, tobacco pipes, trunks, bags, hat boxes, satchels, turpentine (spirits of), umbrellas, unenumerated articles, varnishes, vinegar, watches and movements, wax and manufacturers of, webbing elastic and nonelastic, webbing, non elastic, whips thongs and lashes, window cornices, window shades in the piece, window shade or blind rollers, wood & manufacturers, wool & manufacturers, miscellaneous, special duties, post entries, additional duties, post entries, manufactures total.

Customs revenues classified as exotics:

Cigarettes; coffee, chicory and chocolate (divided by three, two thirds in exotics, one third in manufactures); luxuries; spices; tea; tobacco, coconuts, gutta-percha, ivory  
Spices, tea, tobacco and manufactures thereof.

**USA:** Data were taken from *Statistical Yearbook*.

Import shares are available for wine and spirits separately, but just one aggregated value is available for customs revenues. Thus we assume that wine and spirits have the same tariff rate and split customs revenues using the import shares.

Imports classified as agriculture:

Animals; articles from Hawaiian islands: fruits and nuts; articles from Hawaiian islands: brown sugar; articles from Hawaiian islands: molasses; articles from Hawaiian islands: rice; bark; barks, cork bark and wood; barks, medicinal; bone and horn; bones, crude; breadstuffs; bristles; cork wood; cotton; dairy and meat; eggs; effleurage grease; feathers; felt; fish – total; fish bladders; flax, raw; fruits and nuts; fur skins; grains and ground; hair; hay; herring; hide cuttings; hides and skins; honey; hoofs; horns; hops; horsehair; mackerel; malt, barley; moss, seaweed; oil cake; oils, vegetable; oils, whale or fish; olive oil, salad; olive oil, not salad; other fish; other flax; other hairs; other palm leaf; other seeds; potatoes; provisions; raw hemp; raw jute; rice – total; sardines; sausage skins; seeds – total; silk – total; straw and palm leaf; sugar; vegetables – total; whale and fish; wood, unmanufactured, not elsewhere specified; woods; fibres, vegetable and textile grasses; plants

Imports classified as manufactures:

Acetate; alizarin; anthracite; antimony; art works; art works, not elsewhere specified: paintings, in oil or water colours, and statuary; articles admitted free under reciprocity treaty with Hawaiian islands – total; articles for the use of religious, educational; articles, produced or manufactures of the US, returned; asbestos; asphalt; beeswax; beverages; bismuth; bituminous; blackings; bologna sausages; bolting-cloths; books and other printed matter, not elsewhere specified; brass, and manufactures of; brushes; burr stones; buttons, except of brass, gilt or silk, and buttonmolds, and button materials made in patterns or cut for buttons exclusively; carbonate; cast polished plate; cast polished plate silvered; caustic soda; cement; chalk; charcoal; chemicals; chloride of lime or bleaching powder; chocolate; clays or earth of all kinds, including china clay; clocks and watches – total; cloth; coal; cochineal; coir yarn; coke; confectionery; copper and manufactures of - total, not including ore; copper ore; cordage; corsets; cotton - total, manufactures of; cutch or catechu; cylinder and crown; diamonds; diamonds, rough or uncut, including glaziers diamonds; dyewoods; earthen, stone, and china ware – total; emery ore; fancy

articles – total; fans, except palm leaf; farinaceous substances, and preparations of, not elsewhere specified; fertilizers; firecracker; fluted, rolled or rough plate; furs, manufactures of; glass and glassware – total; glass plates; gloves of kid; glue; glycerine; gold ore; grease; ground plasters, paris; gunny-cloth; gunpowder; gypsum or plaster of paris; hair, not elsewhere specified, and manufactures of hats, bonnets, and hoods, and materials for; hair man.; hats; hatters plush; household and personal effects and wearing apparel in use, and implements, instruments, and tools of trade of persons arriving from foreign countries, and of citizens of the US dying abroad; indian rubber and gutta-percha, manufactures of; indigo; ink and ink powder; iron - total, not including iron ore; iron and steel, and manufactures of; iron ore; jewellery; jute butts; leads; leather, and manufactures of leather -total ; lime, chloride; lithographic stones; madder; man. shell; man. zinc; manganese; manufactured cork; manufactured hemp; manufactures of copper; manufactures of flax; manufactures of flax, hemp, or jute, or of which flax, hemp, or jute shall be the component material of chief value – total; manufactures of jute; manufactures of lead; manufactures of leather – total; manufactures of textiles; marble and stone; matches; matting for floors; meerschaum, crude; metals; mineral water; mineral substances; musical instruments, and parts of; nickel ore; oil, volatile or essential; oils – total; ore; ore , iron; other cast manufactures; other chemicals; other explosives; other manufactures of hemp; other manufactures of jute; other manufactures of leather; other manufactures of tin; paintings; paper and manufactures of; pencils; perfumery; pigs, bars, ingots; pipes; plaster of Paris, or sulphate of lime, ungrounded; platinum, unmanufactured; plumbago; potash; precious stones, not elsewhere specified, and imitations of, not set; printing papers; salt; saltpetre; silk, hosiery; silver ore; soap – total; soda; soda, bicarbonate; sponges; starch; sulphur; sumac; tar and pitch; terra alba; tin in bars; total iron and steel; toys; umbrellas; varnishes; vinegar; watches; wood and manufactures of – total; wools, man.; writing papers; zinc

Imports classified as exotics:

Ivory; cacao; camphor; chicory; chicory root; cigars; cochineal; cocoa coffee substitute; guano; gums; gutta-percha; Indian rubber; opium; other manufactures of tobacco; other special articles; spices; tea; tobacco; tobacco and manufactures of leaf; vanilla beans

Customs revenues classified as agriculture:

Breadstuffs and other farinaceous food; flax; hemp; jute etc., fruits including nuts; sugar; molasses; wood and manufactures of (divided by two, half in agriculture, half in manufactures)

Customs revenues classified as manufactures:

Chemicals; drugs, dyes and medicines; cotton, manufactures of; earthenware and chinaware; fancy articles; perfumery etc.; glass and manufactures of; iron and steel and manufactures of; jewellery and precious stones; leather and manufactures of; manufactures of flax, hemp, jute etc; manufactures of wool; silk and manufactures of (divided by two, half in agriculture, half in manufactures)

Custom revenues classified as exotics:

Tobacco and manufactures thereof

